pensated at the higher levels. In any case, the conclusion is irresistible that the pressure variations are due to *flow* and not to a mere tidal rise and fall of the entire atmosphere.

A further proof that these so-called waves are connected with the seasonal transfers of air between Asia and the Indian Ocean, is the remarkable fact that the pressure variations at Mauritius are exactly contrary to those on the Indian plains, and *in general* similar to those of the vertical anomalies. In other words, the lower atmosphere over the Southern Indian Ocean and the higher Indian air strata are analogous termini of the harmonic oscillations in the general convective interflow over the monsoon and trade-wind area of Southern Asia and the Indian Ocean.

The chief critical epochs of both the vertical anomaly and general pressure anomaly curves observed over the plains, occur in March and November. These are, therefore, the months when the character of the ensuing season may be partially forecasted from an inspection of the pressure curves.

Experience has shown, as Mr. Eliot says, that "the primary maximum values of these oscillations [*i.e.* of the pressures on the plains] occur at the end of cold weather periods, characterised by abundant or excessive precipitation in Upper India and the Western Himalayas, and that the primary minimum values occur near or at the end of south-west monsoon periods during which the rainfall has been more abundant than usual."

If we remember that the cold weather rains occur in a stratum which mostly lies above the upper stations, and that the general variations above and below are almost invariably opposite in character, the empirical rule simply embodies the rational fact that the maximum rainfall occurs in connection with the minimum pressure of the containing air-stratum. Also since the vertical anomaly and plain pressure curves are inverse to each other, the rule may be put thus.

A descending vertical anomaly curve commencing about November, and a descending plain pressure anomaly curve commencing about March, indicate respectively the probability of heavy winter and summer rainfalls. Ascending curves commencing about the same epochs indicate the reverse seasonal conditions.

In the empirical form, these relations are now being successfully employed by the Indian Meteorological Department in its system of seasonal forecasts.

The marked tendency to a semi-annual or multiple semi-annual variation in the general pressure anomalies is curiously analogous to a similar period in cirrus bands noticed by Weber, in solar and lunar halos by Tromholdt, in the aurora Polaris, and in the spots and prominences on the sun.

What causes the equally marked differences which characterise the incidence of these barometric movements and their attendant conditions in different years, is still a mystery. Like most meteorological phenomena, they are probably a resultant of several components, solar, terrestrial, direct, and reactionary.

In any case, it is evident that the general outcome of these Indian meteorological researches, so far as relates to the question of long-period and universal weather changes, is decidedly encouraging, since it is plain that the majority of the anomalies in the Indian area are resoluble into harmonic periodic elements, leaving only a small residual to be labelled non-periodic and unpredictable. The moral, therefore, is not merely to extend terrestrial observation and the discussion of data over wide areas on broad, rational methods, but to endeavour to discover the precise way in which solar changes produce analogous long and short changes in terrestrial weather, especially where, as in India, these relations form such a dominant proportion of the total.

Since the above was written Mr. Eliot's interesting article on "Periodic Variations of Rainfall in India" has appeared.

Referring as it does particularly to the remarkable wave of rain and drought which has occurred during the past five years, it chiefly emphasises the remark made above, that the yearly anomalies in the general meteorological conditions are the resultant of several components —local, general, terrestrial, solar, direct, and reactionary. From the evidence adduced therein regarding the Indian Ocean area, and a general survey of conditions which have obtained in other parts of the world, it appears that this large oscillation has been of world-wide incidence. That it represents something in addition to the ordinary variations in the oscillatory flow of the trade-monsoon currents across the equator in the Indian Ocean. That it is therefore due to some abnormal extra-terrestrial—probably solar—influence, which must be referred to the solar physicists for its solution.

At the same time, its occurrence in no way invalidates the preceding conclusions deduced from a study of the ordinary yearly variations, or weakens the value of Mr. Eliot's vertical anomaly rule, as an empirical criterion of general monsoon characteristics.

MR. NEY ELIAS.

THE name of Mr. Ney Elias, whose death we briefly announced on June 17 (p. 159), is perhaps less familiar to the readers of travel and geography of to-day than it was to similar students of a quarter of a century since. In 1873 the Council of the Royal Geographical Society awarded him the Founders Medal for the successful accomplishment of a most remarkable journey through Western Mongolia. This was a district that no European had traversed since the days of Marco Polo, and notwithstanding the numerous difficulties which Mr. Elias overcame, and the personal danger in which he often stood, he was able to execute unaided a survey of the whole country travelled. The distance travelled was more than 2000 miles, starting from Kalgan, across the desert of Gobi, thence westerly to the Chinese frontier town Kwei-hua, and onward in a north-westerly direction to the Khangai range. The fanatical Mahommedan Mongol tribes, who were at war with the Chinese garrisons, prevented him journeying further to the south, to Kuldja, which was his proposed destination. The murderous devastation occasioned by this insurrection, and the impossibility of securing adequate assistance, compelled him to cross the Russian frontier and seek shelter at the town of Büsk. This journey, which he accomplished in about six months, was not his first experience in China. In 1871 he set out, with a single Chinese servant, to cross the entire continent of Asia, and a few years earlier had penetrated far into the interior with the view of discovering the causes that had forced the Lower Yellow River to forsake its bed and seek a new outlet to the sea. According to Chinese history, this river flowing through the great eastern plain of the country has had a very restless and eventful career. Nine times, within Chinese records, this river has varied its course, and sought a fresh estuary. The positions of the various mouths are scattered up and down the coast, covering, on the whole, five degrees of latitude. The date of the most recent of these fitful excursions is somewhat uncertain, but Mr. Elias concluded, from the observations which he made in 1867, that the change of bed was due to continuous flooding of the country in 1851-2-3, by which various barriers were broken down and changes of level produced. Mr. Elias was subsequently employed in India, and sent to Yunnan and Ladak; also undertaking a mission to Chinese Turkestan. Mr. Elias was a skilled observer in many branches of physics, and in the course of his travels enriched science by many observations. At

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Bhamo, Sawuddy, and at Mandalay he carried on magnetic investigations and determined the variation. His longitudes are generally derived both by the method of lunar distances and by occultations. His skill as an observer is shown by the small differences that separate the results obtained by either method. At Mandalay, for example, the two values are separated by only a little more than a minute of arc. At Leh, actinometric observations engaged his attention; and if the series are not so long as those of Lieut. Hennessey and Mr. Cole, made at a station further south, they still possess great interest owing to the fact that the observations refer to a station so difficult of access. He rendered yeoman's service in the work of demarcating the frontier line between Burmah and the Shan States, and after a life of great adventure and of much service to science, he settled down as Consul-General at Meshed. For this most important post, and the management of the tangled web of diplomatic service, arising from its close connection with the Persian, the Russian, and the Afghan Governments, to say nothing of the restless Kirghiz tribes, he had admirably prepared himself. In 1885 he traversed the difficult Pamir country, and visited those districts on the banks of the Oxus, where may be met tribes of the most diverse races, and whose interests are as varied as the climates under which they dwell.

NOTES.

PROF. VIRCHOW, of Berlin, has been elected a Foreign Associate of the French Academy, in the place of the late M. Tchebicheff.

A CONFERENCE on the subject of the renewal of Antarctic exploration was held in the rooms of the Royal Geographical Society on Monday last, under the presidency of Sir Clements Markham. Themain object of the conference was to induce the Australasian Premiers to bring the matter before their Governments, with a view to inducing them to contribute towards a British expedition under the auspices of the Royal Geographical Society. The conference was attended by, among others, the Duke of Argyll, the Marquis of Lothian, Sir Joseph Hooker, Admiral Sir George Nares, Admiral Sir Erasmus Ommanney, Admiral Sir W. J. L. Wharton, Sir John Kirk, Sir George Taubman Goldie, Prof. Rücker, and the Agents-General of Victoria, New Zealand and New South Wales. The Australasian Premiers were unable to be present. Speeches in favour of the object before the meeting were delivered by the chairman, the Duke of Argyll, Sir Joseph Hooker, Prof. Rücker, and the Agents-General. The chairman announced that the Council of the Royal Geographical Society were prepared to contribute any sum up to 5000*l.* to the amount which the colonial Governments might subscribe to the undertaking, and he expressed the hope that the matter might be pushed to a successful issue next year.

THE Institution of Naval Architects has, in honour of the Queen's Diamond Jubilee, organised an International Congress of Naval Architects and Marine Engineers, which was inaugurated by a conversazione on Monday evening. The congress itself was formally opened at the Imperial Institute on Tuesday by the Prince of Wales, who gave a short speech. On his departure, the chair was taken by the Earl of Hopetoun, the President of the Institution. After the President had delivered his address, papers were read by M. L. E. Bertin, on "Hardened Armour-plates and Broken Projectiles"; by Mr. C. E. Ellis, on "Non-inflammable Wood"; by Sir A. J. Durston and Mr. J. T. Milton, on "The History and Progress of Marine Engineering"; by M. P. Sigaudy, on "Water Tube Boilers." The session will conclude at Newcastle on July 15.

WE regret to announce the death, at the age of eighty-four, of Prof. J. J. Smith Steenstrup, of Copenhagen. After having acted as Lecturer on Mineralogy at Soröe, he was appointed, in 1845, Professor of Zoology and Director of the Zoological Museum at Copenhagen, retiring from his professorial activity in 1885. Prof. Steenstrup was the author of a number of scientific publications, several of which have been translated from the Danish into foreign languages.

AMONG other deaths we notice those of Dr. Alfred Stocquart, Chief Demonstrator of Anatomy in the University of Brussels, and Secretary of the Anatomo-Pathological Society, aged forty-one, of septic poisoning, contracted in making a post-mortem examination; and Dr. B. E. Cotting, for fifty-five years Curator of the Lowell Institute, Boston, Mass.

ACCORDING to a Reuter telegram of July 1 from Madrid, a dispatch from Manila gives some details of the eruption of the volcano Mayon. The village of Libong was completely destroyed, and 120 of the inhabitants were killed. The eruption was accompanied by a violent shock of earthquake.

THE Board of Regents of the University of the State of California have accepted the offer of Mr. C. F. Crocker, to defray all the expenses of an expedition to India to view the approaching eclipse of the sun. The expedition will remain in India from October next till June 1898.

INTENSE heat has prevailed for several days in Kansas and Arkansas, followed, on June 24, by destructive cyclones in Kansas and Missouri, and heavy storms in other States. During the storm at Hopkinsville, Kentucky, on the morning of the date mentioned, two earthquake shocks were felt. The vibrations were from west to east.

THE silver medal of the Zoological Society of London has been conferred by the Council on Mr. Alexander Whyte, who has lately retired from the post of Naturalist to the Administration of British Central Africa. Mr. Whyte accompanied Sir Harry Johnston when he first went out to Nyasaland in 1891, and has had the charge of the botanic garden at Zomba since that date, and performed other duties entrusted to him with zeal and fidelity. Under Sir Harry Johnston's instructions Mr. Whyte has made and sent to England from time to time large and most valuable collections in every branch of natural history. These have been transmitted to the British Museum through the Zoological Society of London, and have formed the subject of numerous communications by various experts to the scientific meetings of that Society. The fauna of Nyasaland, previously quite unknown, has thus become better understood than that of almost any other part of tropical Africa.

SIR MARTIN CONWAY and Mr. E. J. Garwood left London last week for Spitzbergen, their object being to continue the exploration of the interior of the main island begun by them last year. They are to be landed at King's Bay, whence they hope to make sledge expeditions over the northern ice sheet. They intend afterwards to revisit Horn Sound, and complete the scientific exploration of the southern peninsula.

DR. N. A. BUSCH, assistant-director of the Botanic Garden at Dorpat, has been commissioned by the Russian Geographical Society to undertake a botanical investigation of the Province of Kuban in the Caucasus, an almost unexplored territory. An assistant at the same Botanic Garden is also investigating the flora of the Government of Ssaratow.

A KEEPER in the service of the Zoological Society of London left London by the *Arundel Castle* on Saturday last, under arrangements sanctioned by the Colonial Office, to bring home

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